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## EUROPEAN PATENT APPLICATION

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㉕ Applicant: Previdi, Ermanno  
Via Soperga 38  
I-20127 Milano(IT)  
Applicant: Rienzi, Francesco  
Via Stampa 4/A  
I-20123 Milano(IT)

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㉗ Inventor: Previdi, Ermanno  
Via Soperga 38  
I-20127 Milano(IT)  
Inventor: Rienzi, Francesco  
Via Stampa 4/A  
I-20123 Milano(IT)

㉘ Designated Contracting States:  
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㉙ Representative: Modiano, Guido et al  
c/o Modiano & Associati S.r.l. Via Meravigli,  
16  
I-20123 Milano(IT)

㉚ Device for sealingly coupling tubular elements to junction boxes for electrical components.

㉛ The device for sealingly coupling tubular elements to junction boxes for electrical components comprises a connecting element (1) which defines a stem (2) which is internally provided with a through channel (3) and defines an external thread (4) engageable with a threaded seat (5,6) provided on a wall (7) of a junction box (8) for electrical components. The stem (2) is associated, at least at one end, with a head (10) accessible from the outside of the junction box (8), and has rigidly associated therewith a sealing gasket (20) engageable with the outer surface of a tube (30) and abuttable with a frustum flaring (27) which is defined at the inner end of the threaded seat (5,6) for the radial contraction of the gasket (20) on the tube (30) upon the axial compression of the gasket (20) against the flaring (27).

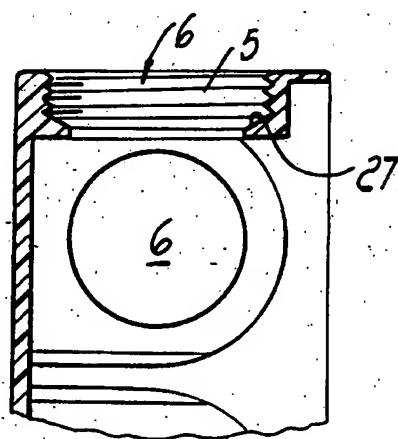


FIG. 2

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The present invention relates to a device for sealingly coupling tubular elements to junction boxes for electrical components.

As is known, junction boxes for electrical components are manufactured with generally square or rectangular shapes and have, on their side walls, one or more openings, depending on the size of the box, for the possible connection of the tubular elements inside which the electric cables are passed.

In order to assure watertightness characteristics of the junction box, closure elements are usually provided at the openings; said closure elements are substantially constituted by elastic membranes which have a stepped convexed shape toward their outside part, so that the installer, during use, cuts out and removes the membrane portion so as to open a hole which matches the external size of the tubular element which must be applied.

The cut membrane, by engaging the outer surface of the tube, must provide a fluid-tight seal with respect to the tube.

This solution, which might work from a theoretical point of view, in practice has proved itself scarcely effective, since defects may occur during the cutting of the membrane, so that the hole which is opened does not match the tube correctly; furthermore, if axial offsets or movements of the tubes occur at the time of installation, said tubes would produce on the membrane forces which could cause the separation of said membrane from said tube in some surface portions, so that there would unavoidably be points or regions where the seal is unstable.

Other known solutions entail the execution, at the inlets, of true expansion seals, with an external ring which acts by compression on a conical gasket which, being compressed axially, generates a contraction in a radial direction, thus providing the seal on the tube.

This solution, which is undoubtedly valid from a functional point of view as regards tightness, is scarcely practical due to the presence of a separate element constituted by the gasket.

These types of inlet furthermore do not allow easy adaptation to the different types of diameters used for the tubes to be connected to the junction box.

The aim of the invention is indeed to solve the above described problem by providing a device for sealingly coupling tubular elements to junction boxes for electrical components which allows to provide a perfect seal at the region where said tubular element is connected, without however having a gasket which constitutes a separate element to be installed separately.

Within the scope of the above aim, a particular object of the invention is to provide a sealed cou-

pling device which can adapt very easily to the different outside dimensions of the tubes without thereby causing complications during installation.

Another object of the present invention is to provide a device for sealingly coupling tubular elements which by virtue of its peculiar constructive characteristics is capable of giving the greatest assurances of reliability and safety in use.

Not least object of the present invention is to provide a device which can be easily obtained starting from commonly commercially available elements and materials and is furthermore competitive from a merely economical point of view.

This aim, the objects mentioned and others which will become apparent hereinafter are achieved by a device for sealingly coupling tubular elements and junction boxes for electrical components, according to the invention, characterized in that it comprises a connecting element provided with a stem having an internal through channel and an external thread screwable in a threaded seat provided on a wall of a junction box for electrical components, said stem comprising, at least at one end, a head accessible from the outside of said junction box and being provided with a sealing gasket engageable with the outer surface of a tube and abuttable with a frustum flaring which is defined at the inner end of said threaded seat for the radial contraction of said gasket on said tube upon the axial compression of said gasket against said flaring.

Further characteristics and advantages will become apparent from the detailed description of a device for sealingly coupling tubular elements to junction boxes for electrical components, illustrated only by way of non-limitative example in the accompanying drawings, wherein:

figure 1 is a schematic perspective view of the device for sealingly coupling tubular elements, applied to a junction box, which is illustrated schematically;

figure 2 is a sectional view of the threaded seat defined on the junction box;

figure 3 is a view of different types of connections for tubes having different diameters;

figure 4 is a schematic sectional view of a plug which can be applied to the threaded seat.

With reference to the above figures, the device for sealingly coupling tubular elements to junction boxes for electrical components, according to the invention, comprises a connecting element, generally designated by the reference numeral 1, provided with a stem 2 having an internal through channel 3 and an external thread 4; said thread can be coupled to the thread 5 of a seat 6 which is defined on the side wall 7 of a junction box, which is generally designated by the reference numeral 8.

Said stem 2 has, at one of its axial ends, a

head 10 which preferably has a hexagonal shape or in any case a shape which can be easily engaged with a tightening tool from the outside of the junction box 8.

An important peculiarity of the invention is constituted by the fact that a plurality of connections 1 is provided and that said connections have the same outside thread, so that they can be coupled in the threaded seat 6, and have, at least at the end opposite to the one provided with the head 10, a gasket 20 which has different characteristics.

An important peculiarity of the gasket 20 is constituted by the fact that it is rigidly associated with the stem 2, and this feature can be obtained either by manufacturing the gasket and the threaded stem by molding in place or possibly by providing, at the portion of the head 10 a recess 21 so as to increase the coupling of the gasket to the stem particularly when a complete chemical affinity does not exist between the materials of the stem and the gasket.

The gasket 20 has a substantially cylindrical shape with an internal hole 25 having different diameters depending on the different diameter of the tubes 30 which must be coupled.

The gasket 20 furthermore has, at the free end of the stem 2, a frustum taper 26 which couples to the frustum flaring 27 which is defined by the inner end of the seat 6 on the junction box, so that the screwing of the connecting element into the seat creates an axial compression of the gasket, with the consequent radial contraction of said gasket against the tube, consequently obtaining a perfect seal.

The gasket 20 can furthermore be provided with, at the head 10, an external flange 28 which is lodged in the recess 21 and an annular enlarged portion 29 which increases the sealing grip on the outer surface of the tube 30, also in case of misalignment.

Obviously, the number of connections may be any according to the type and number of tube diameters, without changing the fact that said connecting elements have the same outside thread so that they can all be coupled in the seats 6.

A plug element, designated by 40, is furthermore provided and has the same shape as the connecting elements 1, with the only difference that it has a completely closed head 41.

From what has been described above it can thus be seen that the invention achieves the intended aim and objects and in particular the fact is stressed that a device for sealingly coupling tubular elements to junction boxes for electrical components is provided which, by using connecting elements which include the gasket with internal diameters which correspond to the different outside diameters of the tubular elements to be coupled, it

is possible to always perform a perfect sealed coupling, in any condition of use, consequently allowing to provide junction boxes with an extremely high degree of protection.

Another important aspect of the invention is constituted by the fact that the junction box which can be obtained is extremely versatile since, during installation, the installer applies in the various seats 6 the required connecting elements or plugs according to the various installation requirements.

In practice, the material employed, which is generally constituted by insulating plastic material, as well as the contingent shapes and dimensions, may be any according to the requirements.

Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly such reference signs do not have any limiting effect on the scope of each element identified by way of example by such reference signs.

### Claims

- 5 1. Device for sealingly coupling tubular elements and junction boxes for electrical components, characterized in that it comprises a connecting element (1) provided with a stem (2) having an internal through channel (3) and an external thread (4) screwable in a threaded seat (5,6) provided on a wall (7) of a junction box (8) for electrical components, said stem (2) comprising, at one end, a head (10) accessible from the outside of said junction box (8) and being provided with a sealing gasket (20) engageable with the outer surface of a tube (30) and abutable with a frustum flaring (27) which is defined at the inner end of said threaded seat (5,6) for the radial contraction of said gasket (20) on said tube (30) upon the axial compression of said gasket (20) against said flaring (27).
- 10 2. Device according to claim 1, characterized in that it comprises a plurality of connecting elements (1) which have the same external thread (4) and a sealing gasket (20) with different internal diameters, according to the diameters of the tubes (30).
- 15 3. Device according to the preceding claims, characterized in that said sealing gasket (20) is produced by molding in place together with said threaded stem (2).
- 20 4. Device according to one or more of the preceding claims, characterized in that said con-

necting element (1) has, at the region of said head (10), at least one recess (21) for inserting an external flange (28) of said gasket (20) coupled to said threaded stem (2) and defining an internal hole (25). 5

5. Device according to one or more of the preceding claims, characterized in that said gasket (20) is provided with, in said internal hole (25) at the region of the head (10), an annular enlarged portion (29) for increasing the sealing grip thereof on the outer surface of the tube (30). 10

6. Device according to one or more of the preceding claims, characterized in that said head (10) has a polygonal shape engageable by a tool. 15

7. Device according to one or more of the preceding claims, characterized in that it comprises a plug-like element (40) closely applicable to said threaded seat (5,6), and provided with said gasket. 20

8. In combination, a junction box (8) and a plurality of coupling elements (1,40) for sealingly coupling tubular elements (30) to the junction box, characterized in that said junction box is provided with a plurality of seats (6) each provided with an internal thread (5), said coupling elements comprising a stem (2) having an internal through channel (3) and an external thread (4) for screwing said stem in said seat (6), said stem further having a gasket (26) with internal hole (25) which abuts against abutment means (27) provided at an inside end of said seat (6) thereby for axially compressing said gasket for a radial compression of said gasket about a tubular element (30). 25

9. The combination of claim 8, characterized in that said abutment means comprise a frustum flaring (27) and said gasket is provided with a frustum taper for engagement therewith. 30

10. The combination of claim 8 or 9, characterized in that all of said seats (6) have a similar internal diameter and all of said coupling elements have an equal diameter stem (2), said internal holes of said gaskets having variable diameter. 35

11. The combination of claims 8,9 or 10, characterized in that said coupling elements further comprise plug stems (40) with closed heads (41). 50

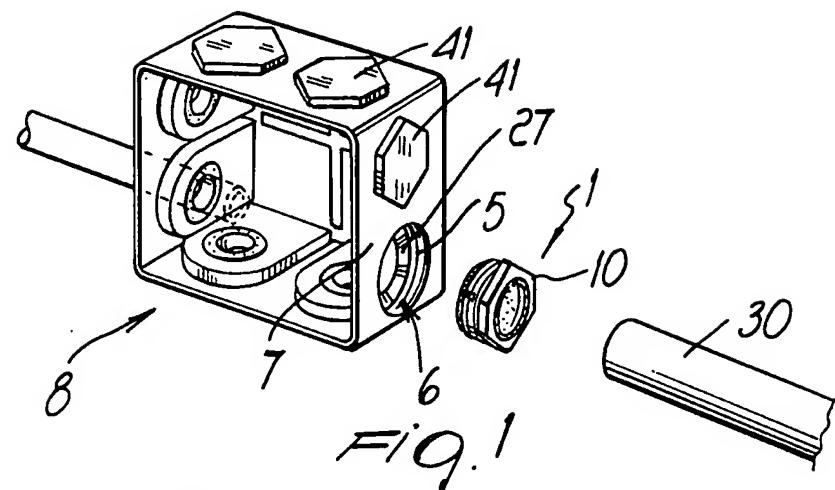


FIG. 1

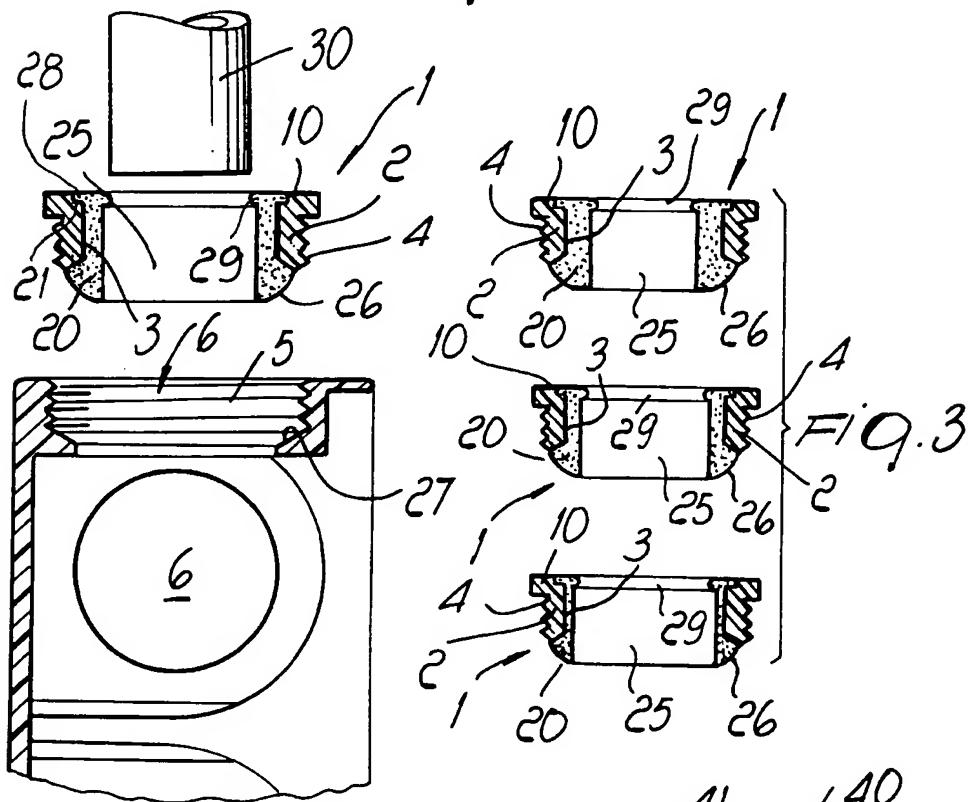


FIG. 2

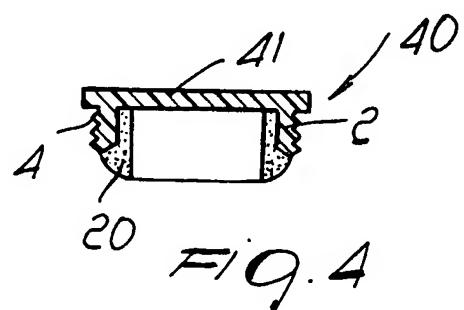


FIG. 4



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## EUROPEAN SEARCH REPORT

**Application Number**

EP 92 10 8505

#### **DOCUMENTS CONSIDERED TO BE RELEVANT**

DOCUMENTS CONSIDERED TO BE RELEVANT		Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
Category	Citation of document with indication, where appropriate, of relevant passages		
X	FR-A-1 282 648 (GARIN)	1	H02G3/06
A	* page 1, column 2 - page 2, column 1; figure 2	3,8,9	H02G3/08
	*		H02G15/013
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A	EP-A-0 402 653 (SIEMENS)	1,2,7,8, 10,11	
	* column 2, line 50 - column 3, line 20; figures 3,6-8 *		
	---		
A	GB-A- 4670 AD 1912 (STRATTON)	1,6,8,9	
	* page 2, line 16 - page 2, line 30; figures 1,3		
	*		
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			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			H02G
The present search report has been drawn up for all claims			
Place of search	Date of compilation of the search		Examiner
THE HAGUE	24 AUGUST 1992		BOLDER G.
CATEGORY OF CITED DOCUMENTS			
X : particularly relevant if taken alone	T : theory or principle underlying the invention		
Y : particularly relevant if combined with another	E : earlier patent document, but published on, or document of the same category		
document of the same category	after the filing date		
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O : non-written disclosure	L : document cited for other reasons		
P : intermediate document	A : member of the same patent family, corresponding document		